

# **A HOUSEHOLD DIGITAL AUTOMATION CONTROL SYSTEM**

## **5 BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a monitoring and controlling device, and more particularly to a household digital automation control system which allows the electric appliances to have a broader signal-receiving area and also  
10 be controlled by one and the same input.

### **2. Description of the Related Art**

People use more and more electric appliances in daily life, such like TV, air conditioner, stereo equipment, and  
15 so on. The aforesaid electric appliances all have particular remote controls for users, and even the switches of light or power source have their specific remote controls as well. The working principle of the remote controls is to send infrared signals to the infrared receivers of the electric  
20 appliances and to control them. However, the way of controlling the electric appliances by emitting and receiving infrared will be limited in area because it needs the user to hold the remote control directly aiming at the electric appliance. If the user stands out of the covering  
25 area of the infrared receivers of the electric appliance, he cannot control the electric appliance anymore. Therefore, it puts the user to inconvenience.

Therefore, a household automation control system was invented as shown in Fig. 1. Said household automation control system comprises a remote control 80 for infrared transmitting, a plurality of transmitters 81 placed in different rooms 90 and 90', a control center 82, a receiver 83 connecting to the transmitters 81, and an emitting unit 85 for receiving signals from the control center 82 to control the electric appliances 84 (like TV and so on). With the remote control 80 sending an infrared signal to the receiver 83, the transmitter 81 is therefore controlled to emit an RF signal to the control center 82. Said signal is then converted into an infrared signal by the control center 82 and sent to each electric appliance 84 in the room 90' by the emitting unit 85.

However, while the remote control 80 sends an infrared signal to the receiver 83, the receiver 83 can receive said infrared signal only if there is no bafflement between it and the remote control 80. That means, if the remote control 80 does not send the signal from the room 90 where the receiver 83 located, the receiver 83 will not able to receive said signal. This is really practically inconvenient.

One way to solve this problem is to add more transmitters 81, control centers 82, receivers 83 and emitting units 85. However, this is not a cost-effective way to do it.

## SUMMARY OF THE INVENTION

Therefore, the purpose of the present invention is to provide a digital household automation control system which is convenient and is controlled by the inputs from multiple sources.

The digital household automation control system in accordance with the present invention utilizes a relay device to receive RF signals from an input, and then converts said RF signals into infrared signals and sends them to the specific electric appliances and controllers. Due to the RF signals being stronger than the infrared signals and having a better penetrating power, they are not limited by the environment or the scope of the receiving area.

Moreover, the converted infrared signals are able to control the electric appliances and controllers more effectively and accurately. Furthermore, because the relative infrared signal to each electric appliances and controllers are all integrated in said relay device, one input can control all the home electric appliances. Certainly, said input can control said controllers directly or indirectly through said relay device. The convenience in managing a house therefore increases.

The advantages of the present invention over the known prior art will become more apparent to those of ordinary skilled in the art upon reading the following descriptions in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing a conventional household automation control system.

5 Fig. 2 is a perspective view showing the circuit of the first preferred embodiment of the present invention.

Fig. 3 is a perspective view showing the setup of the controller of the first preferred embodiment of the present invention.

10 Fig. 4 is a perspective view showing the circuit of the second preferred embodiment of the present invention.

Fig. 5 is a perspective view showing the circuit of the third preferred embodiment of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15 Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

Referring to Fig. 2, the first preferred embodiment of a digital household automation control system comprises  
20 an input 1, a relay device 2 and a plurality of controllers 30; wherein, the input 1 is a remote control 10 in this embodiment, and the remote control 10 includes a transmitting unit 101 emitting RF signals and a plurality of keys 102. Each key 102 represents one controlled electric  
25 appliance (not shown in the figure, such like TV, air conditioner, stereo equipment and so on ) or a controller 30 (such like switch of light 31 and switch of power source

32) . While the user presses the key 102, an RF signal will be emitted to control the relative electric appliance or controller 30. Certainly, the remote control 10 is able to preset the quantity and the order of the electric appliances or the controllers 30 and code the aforesaid setting. Moreover, except emitting a group of RF signals to increase the quantity of controlling the electric appliances or the controllers 30, it can also avoid the neighbors being disturbed by said signals.

10        To be more specific, except being a remote control 10, the input 1 in this preferred embodiment can respectively be a computer 41, a mobile communication unit 42, a network adapter 43, or a detecting actuator 44 as well. They will be explained in the after mentioned descriptions.

15        A computer 41 has a host 411 and a peripheral controlling unit 412 connecting to the host 411,, and a transmitter 413 emitting RF signal is disposed on the host 411. The peripheral controlling units 412 is such as wireless mouse and keyboard and so on (not shown in the figure), control  
20        the RF signals from the transmitting unit 413. Certainly, the computer 41 is also able to connect with a network adapter 43, and the network adapter 43 allows users to connect with the computer 41 through the network. Moreover, the transmitting unit 413 sends RF signals to the relay device  
25        2, and further controls the electric appliances and the controllers 30. Otherwise, the users can also set a setting of coding or timing control in the computer 41, and the

host 411 will follow said setting to operate.

5 A mobile communication unit 42 includes a host 421 and a phone 422 connecting to the host 421 via radiophone network, and a transmitting unit 423 for emitting RF signals is disposed on the host 421. The users therefore can control the host 421 by the set message signals, and further command the relay device 2 to control the electric appliances and controllers 30.

10 A detecting actuator 44 has a detecting unit 442 for detecting and receiving the external changes, a central unit 441 for processing the signals from the detecting unit 442, and a transmitting unit 443 for emitting the signals of the central unit 441; wherein, the detecting unit 442 can receive the feedbacks from the security system (since it is not the characteristic of the present invention, it is not described in detail here) and announce the users through the mobile communication unit 42 or the network adapter 43, and it also can receive infrared detecting signals. While the infrared detecting signals are touched to start, the will operate the electric appliances or the switches 3 respectively or in group. The transmitting unit 443 will code and memorize the quantity and the order of the switches 3 first, and control them then.

25 Additionally, the relay device 2 includes an RF relay unit 21 and an infrared relay unit 22; wherein, the RF relay unit 21 receives the RF signals from the remote control 1, and converts into another signals for emitting to the

infrared relay unit 22, and the infrared relay unit 22 will then emit infrared signals to control the electric appliances and the controllers 30. Besides, the relay device 2 includes an infrared signal receiving unit 23 and a memory unit 24 connecting with the infrared signal receiving unit 23. The infrared signal receiving unit 23 receives the infrared signals from the electric appliances and the controllers 30 and sends said infrared signals to the memory unit 24 for memorizing.

Referring to Fig. 3, the switches 3 used in household are divided to switches of light 31 and switches of power source 32. However, both of them connect to a live line 36 and a ground line 34 from an external power source 35. Each controller 30 can work well if it connects to both the external power source 35 and the ground line 34. A ground wire 38 installed inside a wall 37 is not used here, so the users do not need to dig the wall 37 for connecting the ground wire 38. It is convenient in installing. Besides, each controller 30 has a receiver 301, a central processor 302, and controlling unit 303 controlled by the central processor 302; wherein, the receiver 301 receives the infrared signals from the relay device 2 and then sends said infrared signals to the central processor 302 for comparing and analyzing, and further drives the controlling unit 303 to control the switch of light 31 and switch of power source 32.

Referring to Fig. 2 and Fig. 3, while in operation, the

user can directly press the key 102 of the remote control 1. Except the preset and saved code to the relative electric appliances and the relative controllers 30, each key 102 can also be preset the coding of the quantity and the order of the electric appliances and the controllers 30 following the group mode. Therefore, after pressing each key 102, a relative RF signal will be sent to the transmitting unit 21 of the relay device 2 and it can also avoid the neighbors being disturbed by said signals. Then, it will be converted into another signal and sent to the infrared relay unit 22. After that, the infrared relay unit 22 will send an infrared signal to the relative electric appliances or the relative controllers 30 to control them. To be more specific, the controllers 30 are shown differently due to the different types of the switches of light 31 and the switches of power source 32 in different household. Here the switch of light 31 is taken as an example. With the application of the live line 36 and the ground line 34, except turning on and off the light, it can also control the light intensity of a filament lamp (not shown in the figure) through its switch of light 31 and the usage of the loop of an electricity-saving bulb through its switch of light 31. Otherwise, the switch of power source 32 is directly controlled by the controller 30.

Continuing with the afore description, due to the RF signals being stronger than the infrared signals and having a better penetrating power, the user can press the keys



102 to emit RF signals anywhere under the controlling area. Moreover, the RF signals will be converted into infrared signals, and said infrared signals can effectively and accurately control the electric appliances or the controllers 30 and avoid being affected by the environmental factors. Furthermore, the relay device 2 is controlled by the computer 41, the mobile communication unit 42, the network adapter 43, and the detecting actuator 44 respectively. Therefore, the users can choose to use the computer 41 or follow the conventional communication way or network to directly or indirectly control the input 1 to emit RF signals according to his position. Then, after receiving said signals, the relay device 2 converts them into infrared signals for emitting, and hence controls the electric appliances or the controllers 30.

Continuing with the afore description, if a user wants to increase an electric appliance or a controller 30 for controlling, the only thing he needs to do is to emit infrared signals from the infrared remote control (not shown in the figure) of the afore mentioned electric appliance or controller 30. Then he just waits for the infrared signal receiving unit 23 of the relay device 2 to receive said infrared signals. The relay device 2 will send new infrared signals to the memory unit 24 for memorizing, and the user can therefore control the new set electric appliance or controller 30. In this preferred embodiment, the memory unit 24 of the relay device 2 is used to save the infrared

signals of the electric appliances. Therefore, the remote control 1 in this preferred embodiment has the function of operating one electric appliance once or operating a group of electric appliances at the same time. To achieve the afore mentioned function, the user only needs to use the input 1 for controlling. Further with the communication and the network, the convenience of daily life will therefore increase.

Fig. 4 is the second preferred embodiment of the digital household automation control system; wherein, the RF signals from the input 1 can be received and controlled by the RF relay unit 21 of the relay device 2 as mentioned in last preferred embodiment, or they also can be directly received by the receiver 301 of the controller 30 as this preferred embodiment and does not need the relay device 2 for converting. The receiver 301 then sends said signals to the central processor 302 for comparing and analyzing, and further drives the controlling unit 303 to control the switch of light 31 and switch of power source 32. Therefore, this preferred embodiment achieves the same effect as the first preferred embodiment.

Fig. 5 is the third preferred embodiment of the present invention; wherein, an RF relay unit 103 is disposed on the input 1 and a signal transmitting unit 304 is disposed on the controller 30. After the input 1 controls the controller 30 directly or indirectly through the relay device 2 to operate, the controller 30 will send a feedback

through the signal transmitting unit 304. Moreover, said feedback will be received by the RF relay unit 103. Therefore, the user will understand the controlling status of the controller 30.

5        According to the above description and comparing the present invention with the conventional products, it will be easy to find that the present invention has the following advantages:

3. The present invention utilizes a relay device to receive  
10        RF signals from the relative multiple sources, such as remote control and peripheral equipments...etc, and then converts said RF signals into infrared signals for emitting to the relative electric appliances or controllers to control them. The RF signals being stronger  
15        than the infrared signals and having a better penetrating power, so they are not limited by the environment or the scope of the receiving area. Therefore, the converted infrared signals can control the electric appliances and controllers more effectively and accurately. Moreover,  
20        the infrared signal relative to each electric appliance can be integrated to said relay device. The user can control the input to emit RF signals through any convenient way, and then he can choose to operate one electric appliance once or operate a group of electric appliances  
25        at the same time. Therefore, the user can monitor and control the electric appliances and the controllers , greatly improves the management of a house.

4. Direct to the controlling of the controller of the switches, such as the switch of light or the switch of power source...etc, it is to utilize a live line and a ground line connect with each other for controlling. It means  
5 that it only needs the controller to connect with the external power source for operating. The ground wire is not necessary here. Consequently, while installing, users do not need to dig the wall for connecting the ground wire. The complexity of the line of the switches will  
10 also debase. Therefore, it will be much convenient for installing. Moreover, the application of the controller can also be used in controlling the light intensity of a filament lamp disposed on the switch of light, and to the loop of an electricity-saving bulb.

15 To sum up, the present invention certainly achieves the effect of enlarging the receiving area of the electric appliances and being controlled by the multiple inputs at the same time. Certainly, the present invention reaches  
20 its purpose.

While we have shown and described the embodiment in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present  
25 invention.